EPAct/EISA Testing Status

CRC Emissions Committee Meeting

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EPAct Test Programs

- Light Duty Gas Exhaust Fuels (SwRI)
- Oil Study (NVFEL)
- PM Speciation (ORD NRMRL/NVFEL)
- Nonroad Exhaust (Intertek Carnot)
- Nonroad Exhaust (SwRI)
- E-77-2 evaporative emissions laboratory testing projects
- Percent of High Evap in Fleet, E-77-3 (Colorado/Texas)

Light Duty Gas Exhaust Fuels (SwRI)

- Objective: Phases 1 and 2 are in support RFS 2 and Phase 3 is to establish the effects of RVP, T50, T90, aromatic and EtOH content on exhaust emissions from Tier 2 vehicles
- Collaborating with DOE (NREL)
- Program Design
  - Phase 1 Testing:
    - Testing 75°F over LA92
    - 3 'typical' fuels E0, E10, and E15
    - 19 high sales volume Tier 2, 2 high-emitter and 1 high mileage NLEV vehicles
    - Testing complete for first 19 vehicles
  - Phase 2: Repeat of Phase 1 except at 50°F
    - Testing complete for Fuel 17
    - Testing finishing this week for Fuel 18
    - Should be complete with testing for Fuel 19 by 2nd week of Feb 2009
  - Phase 3: Main Program
    - 27 fuels tested in 19 Tier 2 vehicles, E85 tested in 4 FFVs that are included in the 19
    - Fuel Matrix, 5 variables in matrix
      - Revised matrix goes from 5 E15/4 E20 fuels -> 3 E15/6 E20 fuels to streamline the blending process

Phase 3 Status

- 27 Fuels:
  - All recipes have been sent to SwRI/Halterman
  - 12 fuels in hand blend phase
  - 8 fuels in bulk blend phase
  - 7 fuels delivered to SwRI
- E85 fuel provided by CRC
  - To be shipped from Sarnia, Ontario
- Testing to begin by mid-February

EPAct Fuel Matrix

Phase 3
Base Program (EPA)
(Fuels 1-16) →

Phases 1 and 2
RFS 2 Subset (EPA/DOE)
(Fuels 17-19) →

Phase 3
Additional Fuels (DOE)
(Fuels 20-29) →

E85 (DOE) →

CRC Additional Fuels →

Fuel #	T50 °F	T90 °F	ETOH %	RVP psi	ARO %
1	150	300	10	10	15
2	240	340	0	10	15
3	220	300	10	7	15
4	220	340	10	10	15
5	240	300	0	7	40
6	190	340	10	7	15
7	190	300	0	7	15
8	220	300	0	10	15
9	190	340	0	10	40
10	220	340	10	7	40
11	190	300	10	10	40
12	150	340	10	10	40
13	220	340	0	7	40
14	190	340	0	7	15
15	190	300	0	10	40
16	220	300	10	7	40
17	215	325	0	9	30
18	202	325	10	9	25
19	195	325	15	9	23
20	160	300	20	7	15
21	160	300	20	7	40
22	160	300	20	10	15
23	160	340	20	7	15
24	160	340	20	10	15
25	160	340	20	10	40
26	150	340	15	10	40
27	190	340	15	7	15
28	190	300	15	7	40
29	TBD	TBD	85	TBD	TBD
30	150	325	10	10	40
31	160	325	20	10	15

Revised Fuels

Light Duty Exhaust Fuels (SwRI) Updated Testing Schedule

Phase	Duration	
Fuel blending	February 2008	Early 2009
Phase 1	April 2008	August 2008
Phase 2	November 2008	February 2009
Phase 3	February 2009	December 2009
Reporting	December 2009	March 2010

Fresh Oil PM Study (NVFEL) Program Status

- Oil PM stabilization on E0, E10 and E20 completed
  - EPAct Phase 1 oil aging (2k) "safe" from fresh oil influences on PM
  - Conclusion: Stabilization occurs much lower mileage (.5k to 1k)
    - Likely oil time at temp relationship
    - Did not isolate to PCV (off-gassing) or cylinder surface (oil shearing)
- Abstract submitted to present results at CRC Emissions Workshop in San Diego, March 2009

PM Speciation
(NVFEL/ORD-NRMRL)

- Objective: To determine fuel effects on PM mass, size and composition, and obtain speciated semi-volatile VOC, metals and ions, and gaseous VOC (MSATs), alcohols and carbonyls.
- Program Design
  - E0, E10 and E70/85 fuels
  - 3 vehicles (+/-) similar to SwRI vehicles but not necessarily identical (1 non-FFV)
  - 75F and 20F
- Oil-PM Pilot study will help determine PM metals detection limits (secondary experiment)
- Time Line: 2009
- In process of designing a Round Robin Program split between NVFEL and ORD-NRMRL

Nonroad Exhaust (Intertek Carnot)

- Objective: Test 6 pairs of small SI engines < 25 hp (2 Class 1, 2 Class 2, and 2 Class 4) on 3 fuels (national average E0 (Fuel 17 from fuel matrix), an E10 (Fuel 18 from fuel matrix), and Certification fuel (Indolene))
- Fuels and Aging
  - 2 engines of each engine model
  - One aged on E0 (Fuel 17)
  - One aged on E10 (Fuel 18)
- Emission Test Sequence
  - Baseline: Age each engine for 10 hours and perform 3 emission tests on each fuel (Fuel 17, Fuel 18, and Cert fuel)
  - Aging: Age engine to half life and repeat all emission tests
- Addition:
  - Full life aging for 2 handheld engines (1 on E0, 1 on E10)
- Timeline: Complete by end of January 2009 with report

New Nonroad Program - SwRI

- Objective: Supplement ongoing nonroad ethanol test programs by ARB and EPA on nonroad applications.
  - Collect exhaust emission data (primary, alcohols, N2O, speciation, etc.) on federal test fuel, ARB E10 fuel and an ARB E10 boost to 10psi fuel.

- Engines/applications chosen:
  - Two new 2 stroke motorcycles
  - Two used 2 stroke motorcycles
  - Two used ATV's, *found*
  - One large SI engine with catalyst, *looking for*
  - Two Sterndrive/Inboard marine engines (from ARB)
  - 9 small SI engines < 25 hp (from ARB)

Pending, still looking for; Require unmodified for program

- New/As-is engine condition and certification cycle testing only (no durability or real world aging).

- Timing: Completed by June 2009
- Status: Just started SI engine testing last week